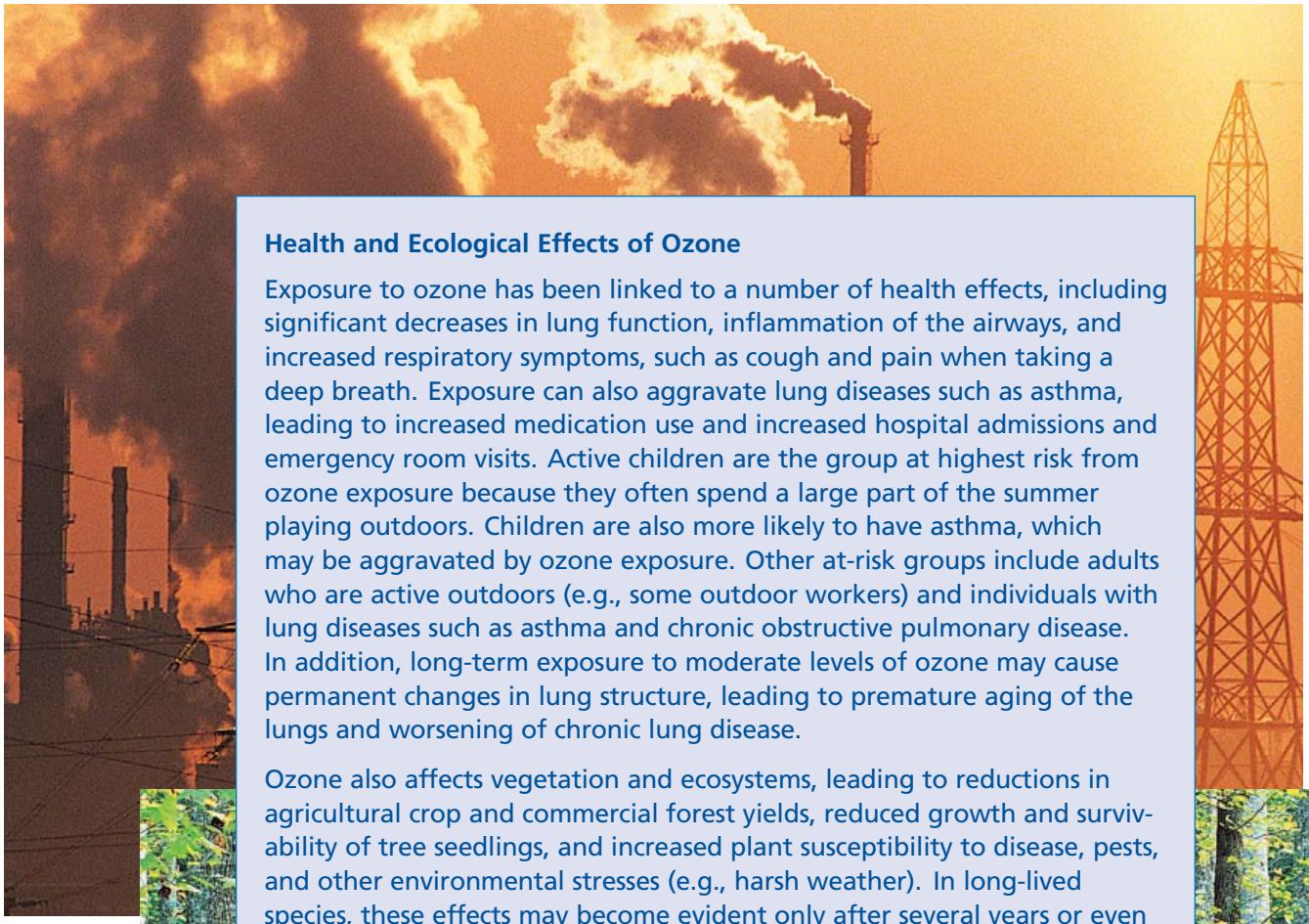
Introduction

In 2003, ozone levels nationwide were the lowest they have been since 1980. Yet ozone continues to be a pervasive air pollution problem, affecting many areas across the country and, at times, harming millions of people, sensitive vegetation, and ecosystems. This report analyzes ozone levels in 2003, summarizes the progress we have made in reducing levels of ozone since 1980, investigates how we have made progress, and looks at our current challenges and long-term prospects for continuing to reduce ground-level ozone. This report does not provide all of the answers, but may bring us closer to understanding the ozone problem, including the links between emission reduction programs, changes in emissions and meteorology, and ozone air quality.

Major Findings

- Ozone levels have decreased over the past 10 to 25 years, and these reductions resulted from emission control programs. In 2003, the improved air quality resulted mainly from favorable weather conditions and continuing reductions in emissions.
- Ozone is at its lowest level nationally since 1980, but the downward trend is slowing. One-hour levels have been reduced by 29% and 8-hour levels by 21%. Ozone levels are still decreasing nationwide, but the rate of decrease for 8-hour levels has slowed since 1990.
- The VOC and NO_x emissions that contribute to the formation of ground-level ozone have decreased 54% and 25%, respectively, since 1970 despite significant increases in vehicle miles traveled (VMT) (155%), population (39%), energy consumption (45%), and the economy (176%). These emissions declined during the 1980s and 1990s and showed continued reductions in 2003.
- Looking at 2003 alone, more than 100 million people lived in the 209 counties with poor ozone air quality based on the nation's 8-hour ozone standard. Most of these counties are located in the Northeast, Mid-Atlantic, Midwest, and California, with smaller numbers of areas in the South and south-central United States.
- The most consistent and substantial improvements in 8-hour ozone levels occurred in the Northeast and southern West Coast. In other areas, where regional transport of emissions is significant, ozone trends appear flatter, indicating the need for greater attention to sources of long-range transported pollutants.
- Meteorologically adjusted trends in many eastern U.S. cities reveal interesting patterns in similar ozone behavior. Many eastern cities exhibited increases in ozone levels during the mid-1990s followed by improvements since the late 1990s.
- Improvements in eastern ozone air quality since the mid-1990s coincide with continued decreases in VOCs together with NO_x emission reductions from the Acid Rain Program and vehicle emission reduction programs. EPA recently proposed rules to reduce transported precursors of ozone and particulate pollution from stationary sources. These rules, along with rules on vehicles and off-road engines, will provide additional NO_x emission reductions.
- Since 1990, most eastern national parks and other federal lands experienced generally improving ozone air quality. However, air quality in western parks appeared to degrade. Ozone trends in eastern national parks/federal lands appear to closely track air quality changes in nearby urban areas.
- Over the next 10 to 15 years, scheduled regional emission reductions are expected to result in significantly fewer areas with unhealthy ozone. However, in several highly populated sections of the country, supplemental local emission control measures will be needed to attain the national air quality standards for ozone. Existing emission control measures are not expected to achieve attainment in those areas even as late as 2015.



Health and Ecological Effects of Ozone

Exposure to ozone has been linked to a number of health effects, including significant decreases in lung function, inflammation of the airways, and increased respiratory symptoms, such as cough and pain when taking a deep breath. Exposure can also aggravate lung diseases such as asthma, leading to increased medication use and increased hospital admissions and emergency room visits. Active children are the group at highest risk from ozone exposure because they often spend a large part of the summer playing outdoors. Children are also more likely to have asthma, which may be aggravated by ozone exposure. Other at-risk groups include adults who are active outdoors (e.g., some outdoor workers) and individuals with lung diseases such as asthma and chronic obstructive pulmonary disease. In addition, long-term exposure to moderate levels of ozone may cause permanent changes in lung structure, leading to premature aging of the lungs and worsening of chronic lung disease.

Ozone also affects vegetation and ecosystems, leading to reductions in agricultural crop and commercial forest yields, reduced growth and survivability of tree seedlings, and increased plant susceptibility to disease, pests, and other environmental stresses (e.g., harsh weather). In long-lived species, these effects may become evident only after several years or even decades and may result in long-term effects on forest ecosystems. Ground-level ozone injury to trees and plants can lead to a decrease in the natural beauty of our national parks and recreation areas.

The National Ozone Standards

In 1997, EPA revised the primary (health) and secondary (welfare) National Ambient Air Quality Standards (NAAQS) for ozone by establishing 8-hour standards. One-hour standards have been in place since 1979. The 1-hour standards are met when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1. The 8-hour standards are met when the 3-year average of the annual fourth highest daily maximum 8-hour average concentration is less than 0.08 ppm. EPA expects to revoke the 1-hour standards 1 year after an area is designated under the 8-hour standards.